



OPTICAL SCANNING APPARATUS CAPABLE OF REDUCING VARIATIONS IN SHADING AND IMPROVING LIGHT USAGE

J.P. [0001] This application is a Division of co-pending U.S. Application No. 09/791,407,
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J.P. filed June 1, 1999, ^{6,229,638,} which is a Continuation-In-Part of U.S. Patent Application No. 09/031,410
which was filed on February 26, 1998, ^{abandoned,} the teachings of which are incorporated herein in their
entirety by reference. ^

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a laser beam optical scanning device for writing data on an optical recording medium preferably for use in a variety of devices including a digital copying machine, a laser printer, an optical disk, and, in particular, to an optical scanning device that is capable of reducing variations in shading and increase light usage during a scanning process.

Description of the Related Art

[0003] An optical scanning device for scanning a scanning surface aligned with the surface of an optical recording medium, such as a photosensitive material, is well known in relation to laser printers or the like. In an optical scanning device, a usual optical arrangement is such that a laser beam from a laser beam source is deflected by a light deflector, such as a rotating polygon mirror, and applied to the scanning surface as a light spot by a scanning lens. Thus, the incident angles of the laser beam on the reflective surface of the light deflector and on the scanning lens are caused to continuously vary during line scanning in the main scanning direction.

[0004] Reflectance of the deflecting reflective surface and reflectance and transmittance of the surface of the scanning lens vary in correspondence with the respective incident angles, so that the intensity of the light spot on the scanning surface generally fluctuates with an image height in the main scanning direction, resulting in an unevenness in image density in the line scanning or a deterioration in gradation. This phenomenon, which is referred to as "shading", is serious when the direction of polarization of the laser beam impinging upon the deflecting reflective surface is parallel with or perpendicular to the deflecting direction.